AFTAC

Air Force Technical Applications Center

RADIONUCLIDE SITE SURVEY REPORT SALCHAKET (EIELSON), ALASKA (RN-76)

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24 February 1999

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Provisional Technical Secretariat
Comprehensive Test Ban Treaty Organization

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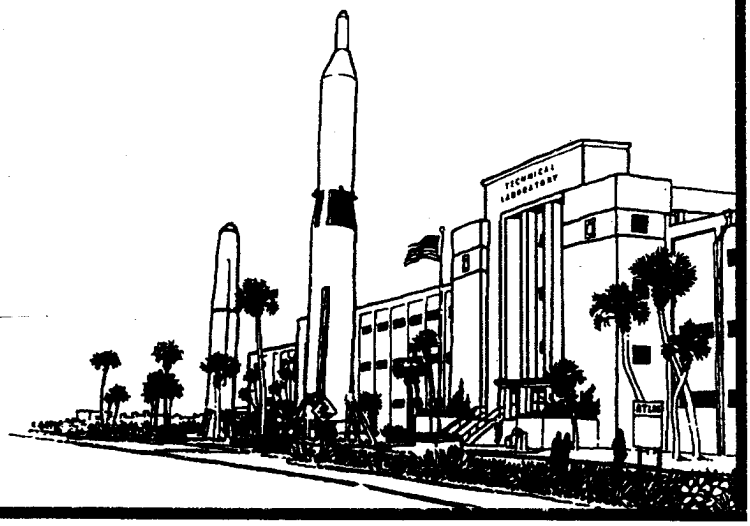

Report AFTAC-TR-99-006 has been reviewed and is approved for publication.

Harold J. Beatty

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Commander

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13. ABSTRACT *(Maximum 200 words)*

The purpose of this report is to validate that the Eielson, Alaska, site will fulfill treaty requirements as set forth by the Preparatory Commission for the Comprehensive Test Ban Treaty Organization.

The team performing the site survey followed accepted scientific methods in collecting air and soil samples near the proposed site. The samples were analyzed by the McClellan Central Laboratory and the results forwarded to AFTAC/TM for review. The team included meteorological and technical staff. Possible sources of radionuclides were examined, as well as meteorological conditions that might affect the validity of recorded data at the site. All necessary background information required by the Commission was researched and is included in the report.

The analysis of the samples identifies all radionuclide isotopoes and their sources that might affect future samples at the site. There are no significant findings that would prevent this site from meeting treaty requirements.

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RADIONUCLIDE SITE SURVEY REPORT

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Introduction

Salchaket, Eielson Air Force Base, Alaska, USA, is listed in the Comprehensive Test Ban Treaty (CTBT) as the location for an International Monitoring System (IMS) radionuclide detection system. This site is located in Building 1183 on Eielson AFB, in North Star Borough, Alaska. The purpose of this report is to validate that the Eielson site will fulfill the requirements for treaty compliance.

Site Survey Guidance

The format and content of this report are based on guidance provided by the Preparatory Commission for the CTBT Organization for conducting and documenting radionuclide site surveys (see CTBT/PC/IV/WGB/1, "Requirements of Site Surveys for Radionuclide Stations," 30 September 1997).

1. General Information

a. CTBT Location Coordinates: 64.40°N/147.10°W

b. Proposed Location: 64°40′11″N/147°5′47″W

c. Altitude: The site elevation is 150 meters (m) above Mean Sea Level (MSL).

d. Locality: The site is located on Eielson Air Force Base in North Star Borough.

e. Province: The site is located in the state of Alaska.

f. Airports: There is one military and one commercial airfield providing access to the site, as shown in Table 1.

Table 1: Local Airports

AIRPORT	DISTANCE FROM SITE	DIRECTION FROM SITE
Fairbanks International	45.0 km	northwest
Eielson AFB	0.1 km	south

g. Seaports: The port of Anchorage, Alaska, is located 700 kilometers (km) to the southwest of the site.

h. Rail Station: The Alaska Railroad station in Fairbanks is located 45 km north of the site. A spur line runs through Eielson AFB, 0.5 km north of the site.

i. Local Access: The Richardson Highway is a four-lane highway that is located 5 km west of the site.

j. Best and most cost effective way for transporting heavy equipment: The best method of transporting equipment to the site is either by rail or commercial highway carrier.

k. Best and most cost effective way for people to access the station location: The best way for people to access the site is by commercial air into Fairbanks and then by rental car to the site.

l. Description: The site is located on level ground in the Tanana Valley. The equipment is housed in an environmentally controlled room in Building 1183, on Eielson AFB.

m. Type of terrain: The site is located on flat terrain in a wide valley.

n. Located in valley/depression: The site is located in a flat valley, with mountains to the northeast and southwest.

o. Grade: N/A

p. Person in charge of the site survey:

(1) Name: James A. Smith
(2) Organization: Det 460
(3) Address: 1183 Flightline Avenue
Eielson AFB, AK 99702
(4) Phone: (907) 377-2423
(5) Fax: (907) 377-3044
(6) E-mail: smithja@ccgate.eielson.af.mil

2. Narrative Site Description

The site is located on Eielson AFB, Alaska, in Building 1183. The facility is owned by the United States Government and is the headquarters for AFTAC Detachment 460. The site is on level ground in the Tanana Valley, approximately 45 km southeast of the city of Fairbanks. There are several large aircraft hangers in the area that are higher than this facility, but far enough away not to obstruct airflow. The room in which the equipment is housed is climate controlled and has adequate power and phone capabilities.

3. Available Buildings and Land for Hosting the Radionuclide Station

The equipment room is in a United States Government-owned building on Government-owned property.

4. Operational Information

a. Responsible Agency: AFTAC Det 460

b. Address: 1183 Flightline Avenue
Eielson AFB, AK 99702

c. Technical contact:

(1) Name: James A. Smith, Det 460
(2) Address: 1183 Flightline Avenue, Eielson AFB, AK 99702
(3) Phone: (907) 377-2423
(4) Fax: (907) 377-3044
(5) E-mail: smithja@ccgate.eielson.af.mil

d. Is the site shared with other organizations or used for additional purposes?
The room in which the air sampler is located is not used by any other organization or for any other purpose.

e. Spare parts availability:

(1) Spares at site: Spare part provisions at the site have not yet been determined. Due to the distance from the manufacturer/maintenance contractor, some spare parts may have to be pre-positioned at the site to maintain operational capability after certification.

(2) Time to replace parts: DME Corporation in Orlando, Florida, is the manufacturer/maintenance contractor. Due to the distance of the contractor from the site, defective part replacement is scheduled to occur within 168 hours if local technical personnel are unable to replace the defective part with on-site spares.

5. Existing Station Infrastructure

a. Air sampler equipment: Ground Filter Unit (GFU) with a motor-driven blower system.

b. Air sampler capacity (m^3/h): The system air flow is 400 m^3/h.

c. Filter Type: The filter type is an IPC 1478 (cotton-based filter paper with Kronisol).

d. Filter efficiency: The filter efficiency @ 2 micrometers and GFU flow velocity is ~ 50%.

e. Filter measuring geometry: Puck (2 inches diameter, 0.5 inch thickness) on face.

f. Operational mode (manual/automatic): This is a manual system. Samples transported by mail to remote laboratory (average one-week transit time). A lead/copper shield is used at the lab.

g. Detector equipment: Germanium detector.

h. Detector(s) relative efficiency: 20-30%.

i. Resolution (keV at 1332 keV): < 2.5keV.

j. Energy calibration range: 40 - 2000 keV.

k. Type of calibration source used (liquid, solid, multinuclide, etc.): Solid, single, and multinuclide.

l. Current operating cycle: The current collection cycle is three times a week.

m. Auxiliary data: None

n. CTBT upgrade required: All site equipment requires upgrade.

o. Electrical power: This system operates on 110/220 volt, 60 Hertz (Hz) power.

p. Back-up power: None

q. Infrastructure (existing lab or equivalent near the station): None

r. Other: N/A

s. Date of the above equipment inventory: 17 December 1998

6. Installing Preferences for Upgrading or for a New Station

a. Type of operation: The proposed station will be an automated operation.

b. Type of system:

(1) Air sampler: The proposed station will employ a Radionuclide Aerosol Sampler/Analyzer (RASA) manufactured by DME Corporation.

(2) Measuring system:

(a) Detector: The detector is a high purity Germanium detector.

(b) Electronic: The electronics package is a DSPec digital spectrometer manufactured by EG&G.

(c) Software: The software is US Government-provided software.

c. Preferences or needs concerning the housing of the station: There are no other needs concerning the housing of the site.

d. Other preferences: N/A

7. Meteorological Information

a. General climate description: Fairbanks, Alaska, is located in the Tanana Valley, in the Alaskan interior. It has a continental climate, with large temperature variations from summer to winter. The local climate is conditioned mainly by the response of the land mass to large changes in solar heat received by the area during the year. The sun is above the horizon from 18 to 21 hours during June and July. During this period, daily average maximum temperatures reach +24 degrees Celsius. Temperatures of +27 degrees Celsius or higher occur about 10 days each summer. In contrast, from November to early March, the period of daylight ranges from 10 hours to less than four hours per day. Temperatures fall below zero regularly during this period. Temperatures of -40 Celsius or colder occur each winter. The temperatures in the summer range from near 0 degrees Celsius to +30 degrees Celsius. In winter, this range is larger, with temperatures ranging from -54 degrees to +7 degrees Celsius. This large winter range of temperatures reflects the difference between frigid weather associated with dry northerly airflow from the Arctic to mild temperatures associated with southerly airflow from the Gulf of Alaska. This southerly flow is accompanied by Chinook winds off the Alaska Range, 128 km south of Fairbanks.

Snow cover is persistent in Fairbanks from October through April. Snowfalls of 10 centimeters or more in a day occur only three times a year during winter. Blizzard conditions are almost never seen, as winds in Fairbanks are above 20 knots less than one percent of the time. Precipitation normally reaches a minimum in spring, and a maximum in August, when rainfall is common. During summer, thunderstorms occur about eight days a year. Thunderstorms are three times more frequent over the hills to the north and east of Fairbanks than they are in the city. Damaging wind or hail rarely accompany thunderstorms around Fairbanks.

There are rolling hills reaching elevations up to 600 meters to the north and east of the city. During winter, the uplands are often warmer than Fairbanks, as cold air settles into the valley. In some months, temperatures in the uplands will average more than 10 degrees Celsius warmer than Fairbanks. During summer, the uplands are a few degrees cooler than the city. Precipitation in the uplands is approximately 20 to 50 percent heavier than in Fairbanks. Low lying areas nearby, such as the community of North Pole, are often colder than the city by as much as 9 degrees Celsius.

During winter, with temperatures of -29 degrees Celsius and colder, ice fog frequently forms in the city. Cold snaps accompanied by ice fog generally last about a week, but can last three weeks in unusual situations. The fog is normally less than 90 meters deep, so that the surrounding uplands are usually in the clear with warmer temperatures.

Local rivers normally begin to freeze the first week of October and remain frozen until early April. Ice breakup begins in early May.

b. Average annual rainfall: The average annual rainfall is 33.8 cm.

c. Maximum rain precipitation per 24 hours: The maximum rain recorded in a 24-hour period was 8.66 cm and occurred in the month of August.

d. Snowfall: Recorded snowfall has occurred in every month except August. The mean annual snowfall is 187 cm. The maximum snowfall in one month was 133 cm and occurred in December. The maximum snowfall in a 24-hour period was 36 cm and occurred in the month of February.

e. Prevailing wind direction: The prevailing wind is from the southeast.

f. Maximum wind speed: The maximum recorded wind speed is 64 knots.

g. Min/Max temperature and annual average temperature: The lowest recorded annual temperature was -54°C and occurred in the month of January. The highest recorded temperature was 34°C and was recorded in the months of both June and July. The mean average temperature is -3°C.

h. Nearby large bodies of water: The Tanana River runs north/south within 10 km west of the site. The Yukon River is 175 km to the north. Numerous other small lakes, streams, and rivers are within 100 km of the site. The Bering Sea is located 650 km west and the Gulf of Alaska is located 420 km south of the proposed site.

i. Nearby mountain ranges: The Alaskan Range runs northeast to southwest throughout the area of the site. Mt. McKinley, the highest peak in North America with an elevation of 6,194 meters, is located 260 km southwest of the site.

j. Nearby population centers: Eielson AFB has a population of approximately 5,250. Fairbanks has a population of 36,000, with an additional population of 50,000 in the surrounding suburbs and small towns.

k. Industrial pollution: The industrial pollution is indexed as 60 out of 500 on the Environmental Protection Agency (EPA) Pollution Standards Index (PSI). A level at or below 100 indicates that a pollutant reading is in the satisfactory range. During January, levels of carbon monoxide reached levels of 175 on the index but did not exceed 100 for the rest of the test year. The pollutants indexed by the PSI are called "criteria pollutants." They are pollutants for which science-based health criteria are used to determine the allowable ambient (outdoor) air concentrations. The EPA regulates the criteria pollutants because of their impact on human health and the environment. They are:

Carbon monoxide (CO)
Ground-level ozone (O_3)
Lead (Pb)
Nitrogen dioxide (NO_2)
Particulate matter (PM_{10})
Sulfur dioxide (SO_2)

The standards or allowable concentrations for these six pollutants are known as National Ambient Air Quality Standards (NAAQS).

The main pollutants identified were carbon monoxide and particulate matter.

l. Nearby weather station: The nearest weather station is 0.5 km west of the site on Eielson Air Force Base.

m. Person or institution that provided meteorological report:

(1) Name: SSgt Jason Macartney, Staff Meteorologist, AFTAC/TMSW

(2) Address: 1030 S. Highway A1A, Patrick AFB, FL 32925-3002

(3) Phone: (407) 494-7933

(4) Fax: (407) 494-5450

n. Date of this report: 31 July 1998

o. Description of local microclimate situation: The local microclimate conditions are sub-zero temperatures with low humidity.

p. Recency of above data: The meteorological data used hourly weather observations from July 1983 to June 1993. The pollution data was measured from January 1997 to December 1997.

8. Safety

a. Natural hazards: The hazards in Table 2 reflect the associated risk level to the station (risk level: non-existent, very low, medium, high, very high). Hazard maps depicting earthquake and volcanic activity are shown in Annex J.

Table 2: Natural Hazards

Hazard	Risk level	Hazard	Risk level
Hurricane	non-existent	Landslide	very low
Tornado	very low	Volcanic activity	medium
Tsunami	non-existent	Animals	very low
Flood	very low	Other	none
Earthquake	medium		

b. Description and possible countermeasures:

(1) Potential safety issues on human activities in the surrounding areas: The only safety hazard would be exposure to sub-zero temperatures while accessing the site. The equipment is located in a limited access facility.

(2) Potential terrain issues: The area is subject to heavy snowfall accumulations and sub-zero temperatures.

9. Environmental Issues

There are no other environmental issues.

10. Radiological Information

a. Average and seasonal range of Pb-212 airborne concentration: The average Pb-212 concentration was 0.103 mBq/m^3. Insufficient data exist to provide seasonal range information. The average readings were based on daily measurements for three consecutive days in September 1998.

b. Average and seasonal range of Be-7 airborne concentration: The average Be-7 concentration was 0.925 mBq/m^3. Insufficient data exist to provide seasonal range information. The average readings were based on daily measurements for three consecutive days in September 1998.

c. Average and seasonal range of Cs-137 airborne concentration: No Cs-137 data were sampled.

d. Average and seasonal range of Pb-210 airborne concentration: No Pb-210 data were sampled.

e. Other natural and/or anthropogenic radionuclides: Other natural and/or anthropogenic isotopes that were measured are shown on page 8 in Table 4 and Figure 1.

f. Nearby nuclear power plants: No commercial nuclear power plants are located within the state of Alaska.

g. Nearby plants where radioisotopes are used or produced: None

h. Constant and episodic anthropogenic sources of radionuclides: Isotopes found in the air samples and not observed in the ambient background were Be-7, Po-210, Bi-211, Bi-212, Bi-214, and Ac-228. In the soil samples, Cs-137, Bi-211, Bi-212, Bi-214, Pb-214, Ra-224, Ra-226, Ac-228, Th-228 and Pa-234m were identified after not being detected in the corresponding background. Of all of these, Cs-137 is the only one that is not part of a natural process or a natural decay chain. The Cs-137 is likely a remnant of the Chernobyl accident and atmospheric nuclear testing, and the Be-7 produced in the upper atmosphere is periodically swept into the soil by precipitation or the settling of dust. The remainder of the isotopes observed were a higher concentration in the air and soil samples than occurred in the counting room background. These isotopes are naturally occurring and/or are part of the natural decay chain and included K-40, Bi-211, Pb-212, Bi-214, Pb-214, Ac-228, Th-228, Th-231, Th-234, Pa-234m, and U-235. Although only the major decay branch corresponding to U-235 was observed for all but one sample, it appears there is a slight but significant amount of natural uranium found in this area. Several isotopes from the U-238 decay series were also present. No other known sources of radionuclides have been identified.

i. Other potential man-made radioactive sources: Two local hospitals within 50 km of the site have nuclear medicine facilities. These sites may produce radioactive isotopes that may be sampled at the site. Table 3 shows the medical facilities and the distances and directions from the site.

Table 3: Local Hospitals with Nuclear Medicine Departments

Hospital	Distance From Site	Direction From Site
Fairbanks Memorial	40 km	northwest
Massett Army Community	25 km	north

j. Elevated natural radiation sources: None

k. Other: N/A

l. Recency of above data: 23 November 1998

11. Schedule and Measurements

a. Period of the on-site survey: 18-21 September 1998

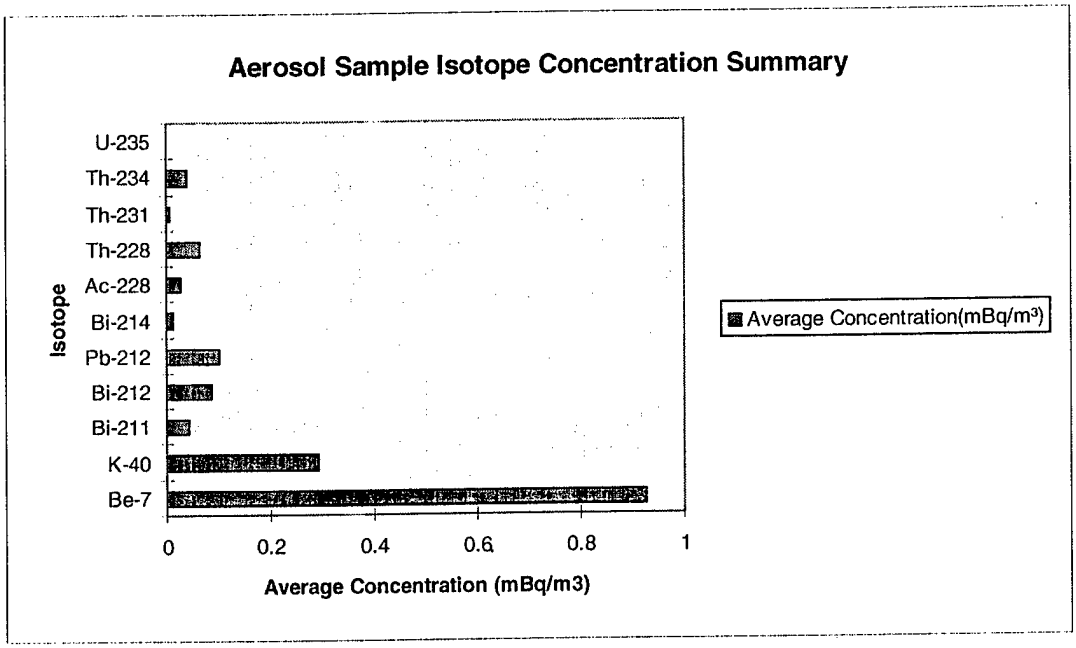
b. Dose rate measurements: N/A

c. In situ gamma spectrometry: N/A

d. Aerosol filter measurement: Aerosol sample concentration measurements are shown in Table 4 and Figure 1 below.

Table 4: Summary of Aerosol Sample Measurement Concentrations

Isotope	Average Concentration (mBq/m^3)	Standard Deviation (mBq/m^3)
Be-7	0.925	0.78
K-40	0.291	0.18
Po-210	38200.0	
Bi-211	0.0424	0.03
Bi-212	0.0859	0.04
Pb-212	0.103	0.09
Bi-214	0.0132	0.01
Ac-228	0.0291	
Th-228	0.0647	0.05
Th-231	0.00492	
Th-234	0.0401	0.01
U-235	0.00192	0.00



NOTE: Po-210 not graphed because average sample concentration was too large.

Figure 1: Aerosol Sample Isotope Concentration Summary Graph

e. Soil/rock samples:

Table 5: Soil Sample Isotope Measurements

Sample #	1		2		3		4		5		6	
Isotope	Conc (mBq/ gm)	% Error	Conc (mBq/ gm)	% Error	Conc (mBq/ gm)	% Error	Conc (mBq/ gm)	% Error	Conc (mBq/ gm)	% Error	Conc (mBq gm)	% Error
K-40	209.0	7.80	232.0	8.66	269.0	7.23	249.0	6.61	199.0	7.45	239.0	6.08
Cs-137							1.60	25.91	1.57	24.85		
Bi-211	22.50	21.91	19.40	30.31	21.80	23.65	6.94	67.72	3.19	141.30	6.12	66.93
Bi-212	11.90	28.76	15.20	27.28	12.00	29.14	13.50	21.55	13.70	22.11	11.50	21.97
Pb-212	13.70	6.44	15.00	6.79	16.10	5.67	13.50	5.75	9.87	7.30	11.30	5.93
Bi-214	13.70	8.39	14.50	10.40	14.10	8.41	9.85	10.89	10.90	10.16	9.29	10.24
Pb-214	4.63	30.88	12.40	12.49	8.12	16.61	9.63	11.76	9.43	11.49	8.35	11.87
Ra-224	40.20	22.17	36.00	29.93	31.90	28.58	18.30	27.77	12.00	48.14	32.20	19.94
Ra-226									20.50	436.26		
Ac-228	15.90	8.24	20.50	7.96	21.50	7.56	10.80	12.70	11.90	12.05	11.60	10.77
Th-231			4.33	311.18								
Th-228					37.10	58.06	55.60	19.82	48.00	17.40	48.70	15.66
Pa234m			179.0	40.6	183.0	36.58			95.8	83.61		
Th-234	9.79	86.45	51.40	17.56	21.40	35.96	28.70	21.25	42.40	23.53	19.90	27.12
U-235	2.20	28.30	2.00	34.23	1.78	35.95	1.34	33.73	0.674	804.94	1.13	35.23

Table 6: Soil Sample Isotope Average Concentrations

Isotope	Avg Conc. (mBq/gm)	Std. Dev.
K-40	233.00	25.60
Cs-137	1.58	0.0255
Bi-211	13.30	8.83
Bi-212	13.00	1.43
Pb-212	13.20	2.31
Bi-214	12.00	2.31
Pb-214	8.76	2.53
Ra-224	28.40	10.90
Ra-226	20.50	N/A
Ac-228	15.40	4.72
Th-231	4.33	N/A
Th-228	47.30	7.62
Pa-234m	152.00	49.10
Th-234	28.90	15.40
U-235	1.52	0.577

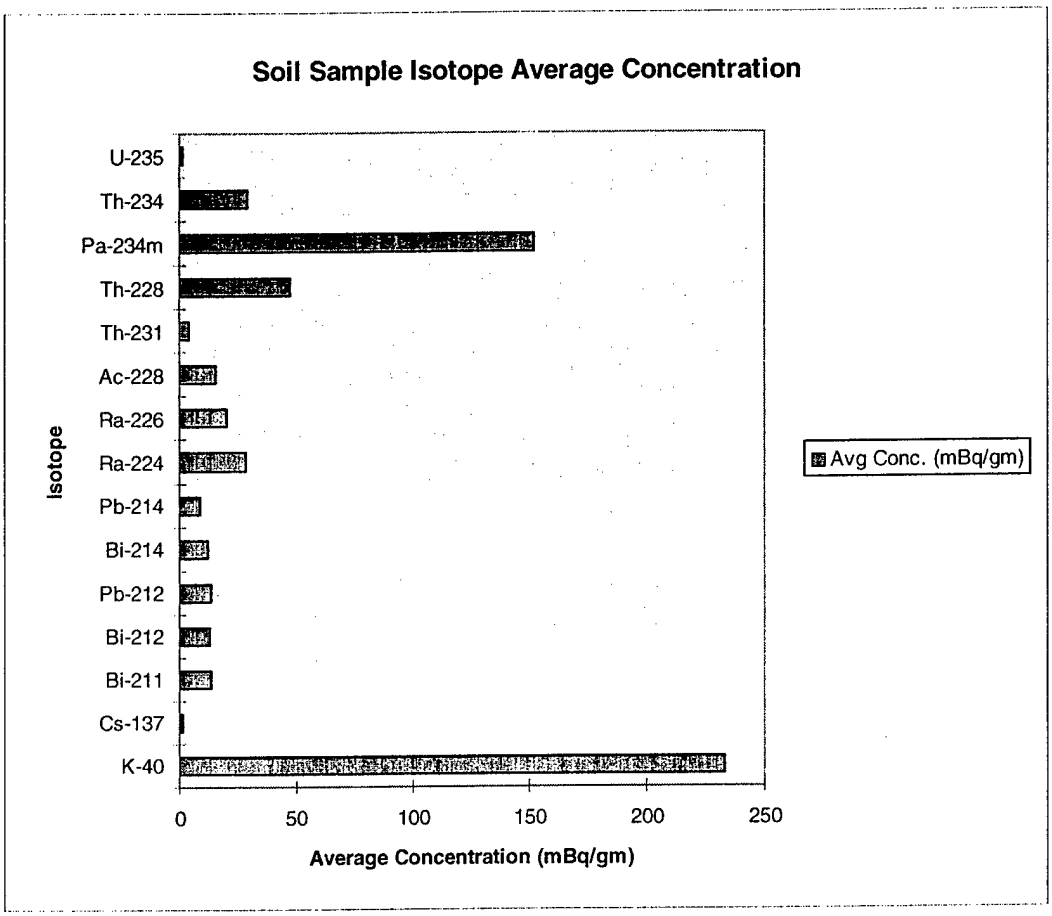


Figure 2: Soil Sample Isotope Average Concentration Graph

12. Observations, Reasonings, Discussion, and Recommendations

a. Air flow decoupling at site: Air flow decoupling rarely occurs at the site. See Annex D for detailed decoupling data.

b. Microclimate conditions at site: The local microclimate conditions are sub-zero temperatures with low humidity.

c. Infrastructure: The entire site needs to be upgraded to meet IMS specifications. This is an upgrade of equipment from the current GFU to the RASA.

d. Background radioactivity (natural/anthropogenic): All known natural and anthropogenic radionuclide sources have been identified and are not considered significant.

e. Communications (proposed locations of VSAT antenna, host country communication regulations, etc.): Communication is by commercial telephone line.

f. Final evaluation: The location is expected to fulfill IMS requirements.

Annex A: Local and General Area Siting Maps of Eielson AFB, Alaska

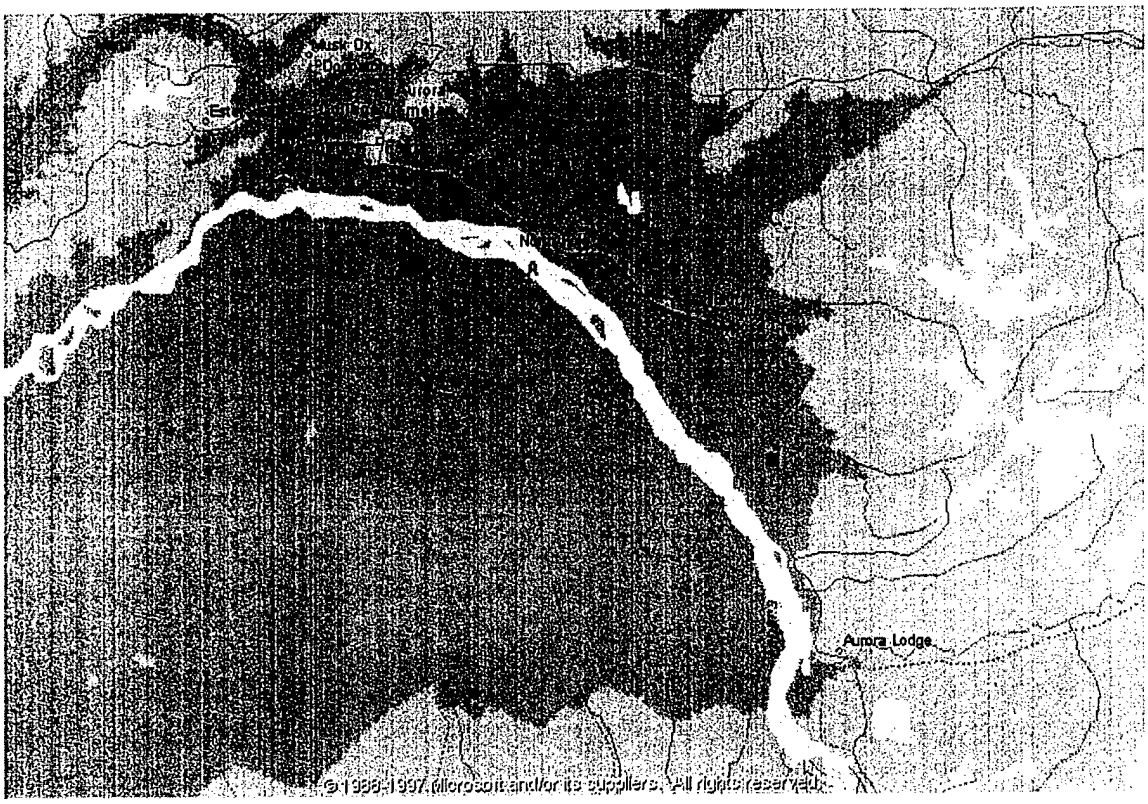


Figure A-1: General Area Map

Annex A: Local and General Siting Maps of Eielson AFB, Alaska (continued)

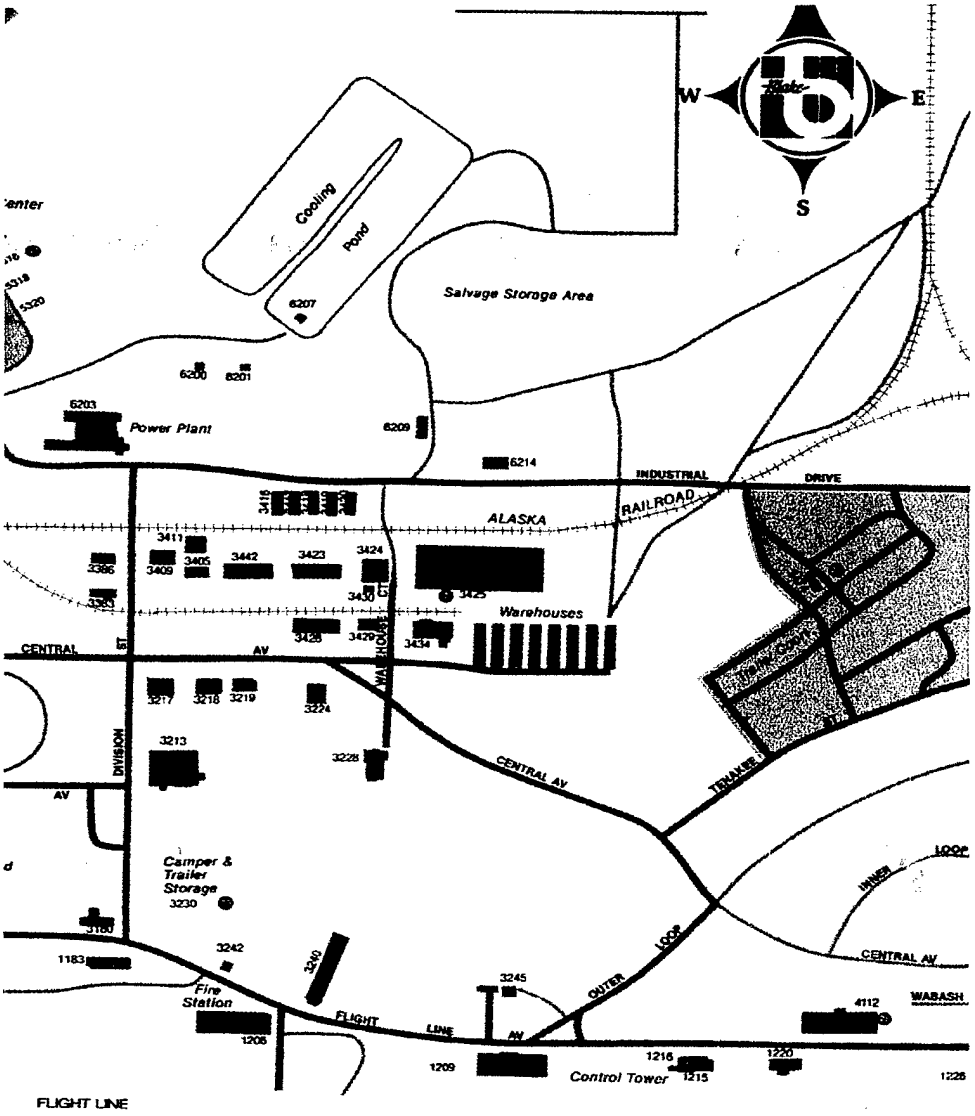


Figure A-2: Local Area Map

The RASA is located in Building 1183, south of the intersection of Flight Line Road and Division Street.

Annex B: Site Photographs

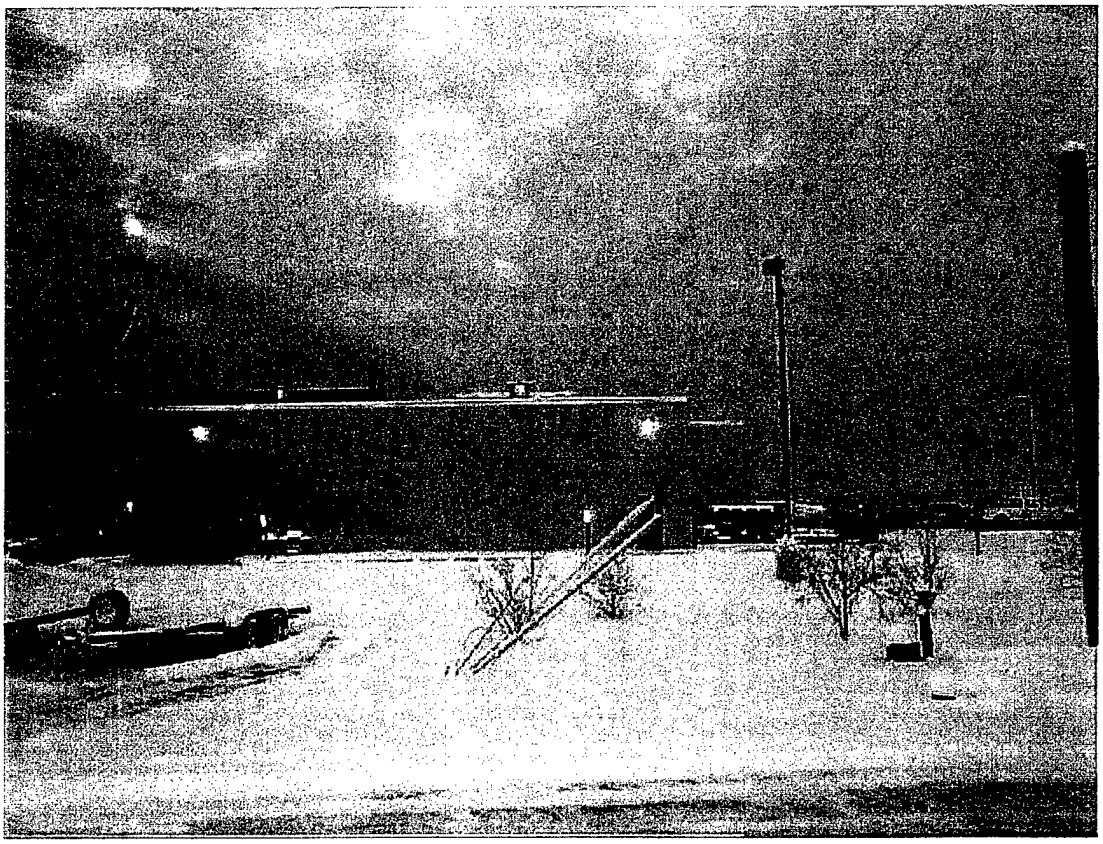


Figure B-1: View from Site to North

Annex B: Site Photographs (continued)

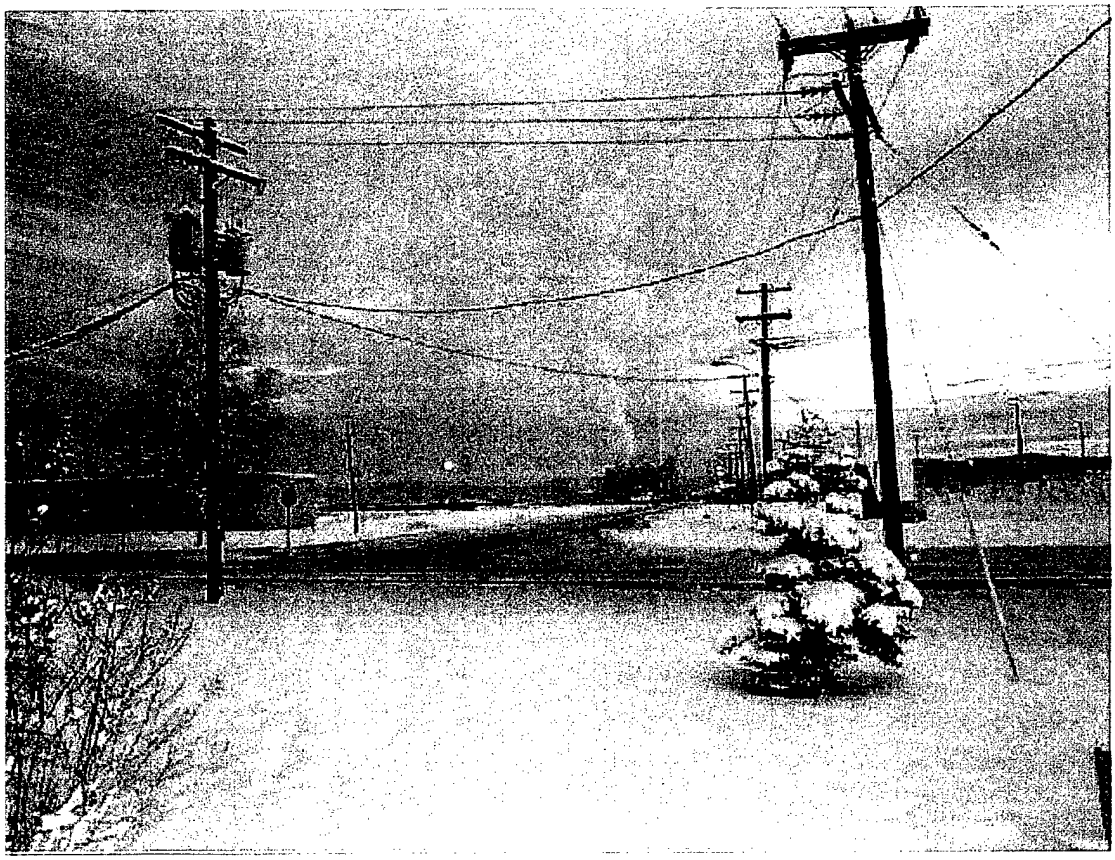


Figure B-2: View from Site to East

Annex B: Site Photographs (continued)

Figure B-3: View from Site to South

Annex B: Site Photographs (continued)

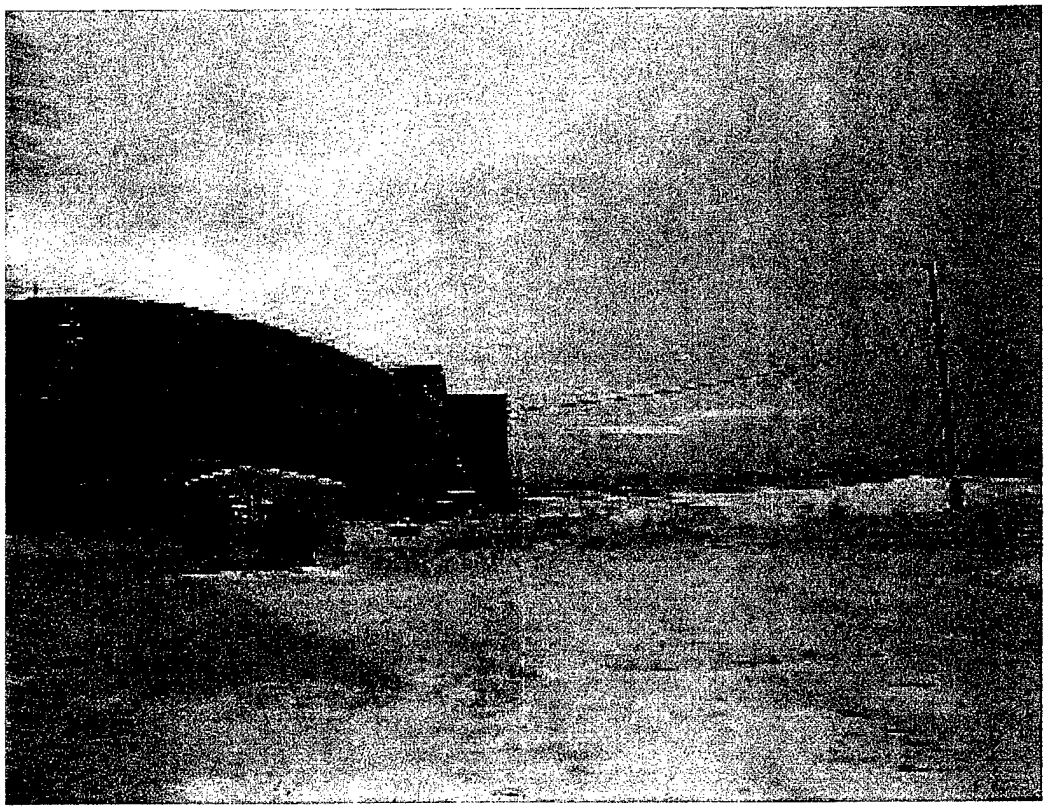


Figure B-4: View from Site to West

Annex C: Annual Meteorological Graphs

Yearly graphs of wind speed, temperature, precipitation and snowfall.

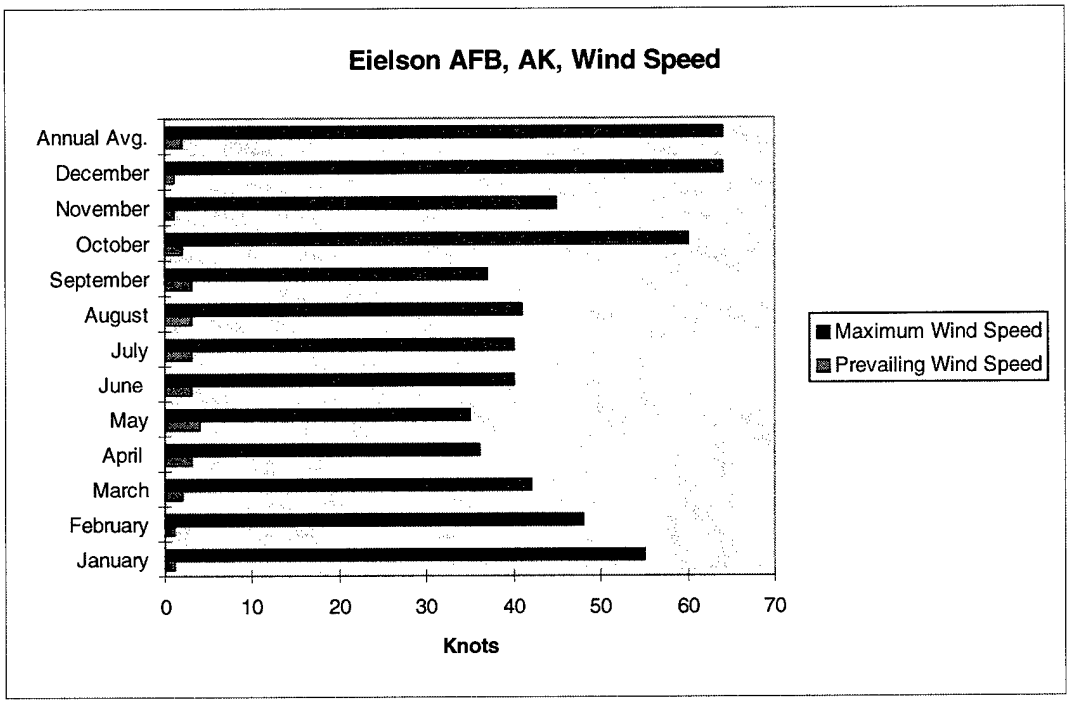


Figure C-1: Annual Wind Speed Graph

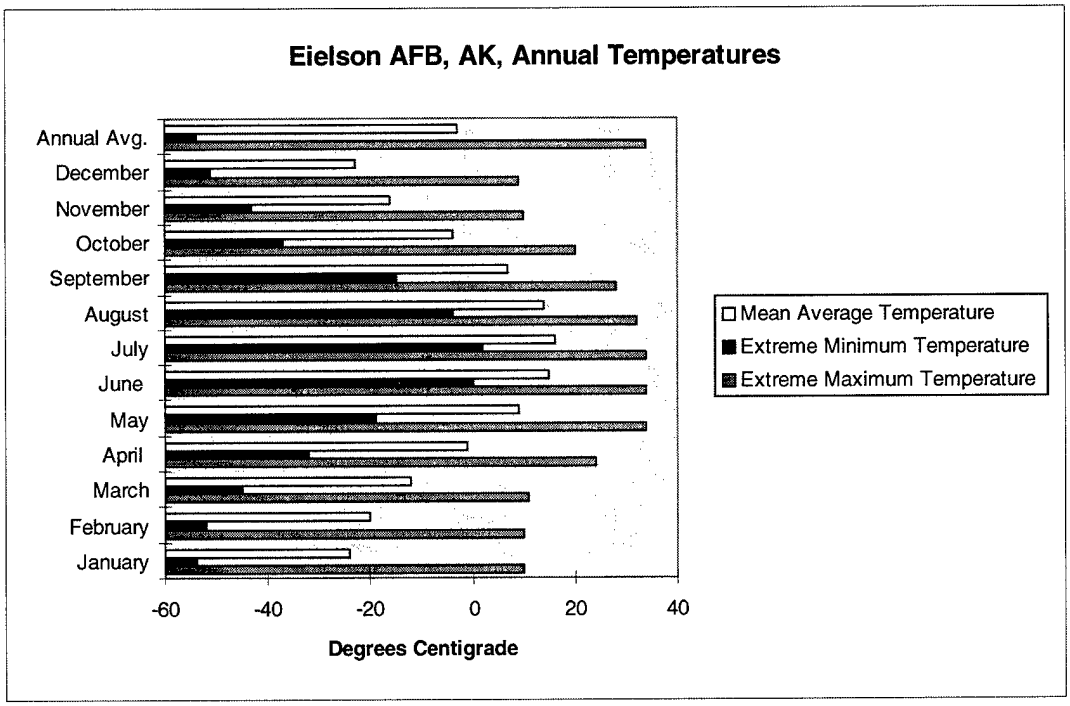


Figure C-2: Annual Temperature Graph

Annex C: Annual Meteorological Graphs (continued)

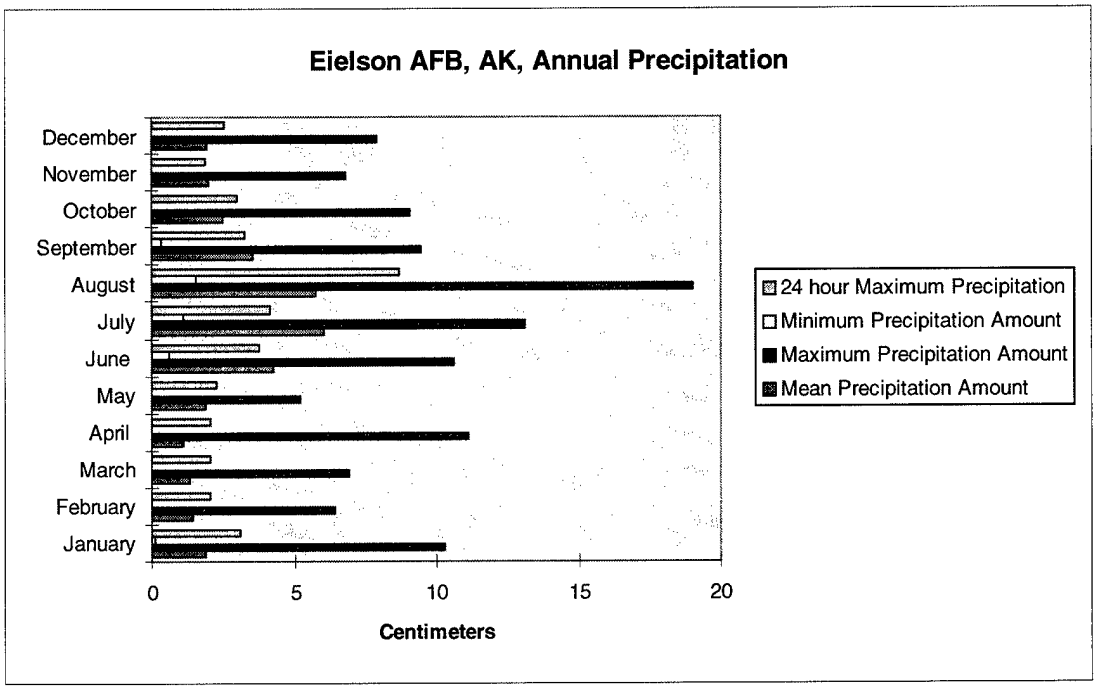


Figure C-3: Annual Precipitation Graph

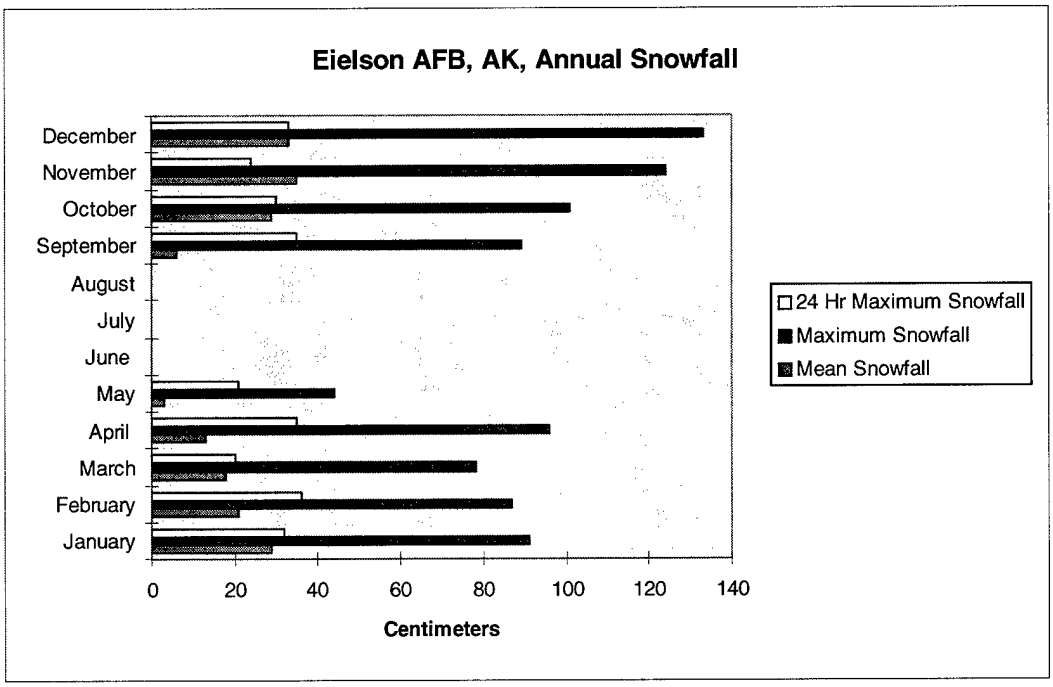


Figure C-4: Annual Snowfall Graph

Annex D: Decoupling Report

Meteorological data/report that attests that the site survey area is not decoupled from upper airflow for a period greater than 24 hours.

The average decoupling estimate is based on the climatological record of the Pasquill-Gifford stability classes for the site, where D is neutral, A is very unstable and G is very stable. To estimate the site decoupling, the percentage of time the site experienced Pasquill-Gifford stability classes of F and G was summed. These are defined as stable conditions for F and extremely stable for G. The underlying assumption is that decoupling will only occur when the atmosphere is stable. These two stability classes can only occur at night, with wind speeds less than 3 meters/second, and less than half the sky can have clouds. This data is based on hourly surface observations taken at each station.

The F and G conditions generally do not last more than 2-3 hours during a specific day at Eielson AFB (see Table D-1). Therefore, the Eielson AFB sampling site is not decoupled from the upper atmosphere for periods exceeding 24 hours.

Period of Record: 1973-1997

% Frequency of Occurrence
Stability Indices for Eielson AFB, AK

Source: Eielson AFB, AK, Met Office

Table D-1: Decoupling Frequency of Occurrence

Stability Index	% Freq of Occurrence	Stability Index	% Freq of Occurrence
Jan F&G	52,8%	Jul F&G	12.6%
Feb F&G	42.9%	Aug F&G	16.7%
Mar F&G	33.6%	Sep F&G	21.6%
Apr F&G	25.9%	Oct F&G	23.7%
May F&G	16.5%	Nov F&G	40.7%
Jun F&G	11.7%	Dec F&G	51.5%

Annex E: Local Weather Conditions

Meteorological report by experts on local weather conditions (local air flow)

Ten Year Meteorological Report
(Jul 83 - Jun 93)

Table E-1: Meteorological Data Summary of Local Conditions

	Mn Max Tmp	Mn Min Tmp	Mn Avg. Tmp	Ext Max Tmp	Ext Min Tmp	Mn Pcp Amt.	Max Pcp Amt.	Min Pcp Amt.	24hr Max Pcp	Prev Wnd Dir	Prev Wnd Spd	Max Wnd Gust	Mn Snw Fall	Max Snw Fall	24hr Max Snw
Jan	-19	- 28	-24	10	-54	1.90	10.3	0.13	3.07	SE	1	55	29	91	32
Feb	-14	-9	-20	10	-52	1.45	6.4	T	2.06	SE	1	48	21	87	36
Mar	-5	-27	-12	11	-45	1.30	6.8	T	2.03	SE	2	42	18	78	20
Apr	-7	-1	24	-32	1.1	11.1	11.1	T	2.03	SE	3	36	13	96	35
May	15	3	9	34	-19	1.88	5.2	0.05	2.26	W	4	35	3	44	21
Jun	21	9	15	34	0	4.24	10.6	0.61	3.76	W	3	40	T	T	T
Jul	22	10	16	34	2	6.02	13.1	1.09	4.17	W	3	40	0	0	0
Aug	19	8	14	32	-4	5.77	19.0	1.52	8.66	W	3	41	T	T	T
Sep	12	2	7	28	-15	3.51	9.4	0.33	3.28	SE	3	37	6	89	35
Oct	0	-08	-4	20	-37	2.50	9.0	0.70	3.00	SW	2	60	29	101	30
Nov	-12	-20	-16	10	-43	1.98	6.8	T	1.88	NE	1	45	35	124	24
Dec	-19	-26	-23	9	-51	1.93	7.9	0.03	2.54	SE	1	64	33	133	33
Ann	2	-9	-3	34	-54	33.8	62.6	14.60	8.66	SE	2	64	187	482	36

Data listed in Table E-1 are measured in degrees Centigrade, centimeters of precipitation, and knots of wind speed.

Annex F: Experimental Air Sampler Raw Data

Aerosol Sample Collection/Measurement Information **Eielson AFB, Alaska**

Table F-1: Aerosol Sample Collection/Measurement Information

Samp ID	Collection Start	Collection Stop	Volume (m3)	Acquisition Start	Isotope	Conc. (mBq/m3)	% Error
1	18-Sep-98	19-Sep-98	8325.6	22-Sep-98	Be-7	1.830	3.37
					K-40	0.131	39.23
					Po-210		
					Bi-211	0.0105	155.26
					Bi-212		
					Pb-212	0.0189	16.25
					Bi-214	0.0175	21.81
					Ac-228		
					Th-228		
					Th-231		
					Th-234	0.0338	102.04
					U-235	0.000288	844.51
2	19-Sep-98	20-Sep-98	8428.8	22-Sep-98	Be-7	0.445	5.84
					K-40	0.253	23.70
					Po-210		
					Bi-211	0.0797	13.46
					Bi-212	0.0570	24.53
					Pb-212	0.1011	3.86
					Bi-214	0.0179	18.89
					Ac-228	0.0291	14.64
					Th-228	0.0977	68.19
					Th-231		
					Th-234	0.0463	61.65
					U-235	0.00299	75.42
3	20-Sep-98	21-Sep-98	8289.6	22-Sep-98	Be-7	0.502	5.37
					K-40	0.490	11.19
					Po-210	38200.0	32.08
					Bi-211	0.0370	23.69
					Bi-212	0.115	13.10
					Pb-212	0.190	2.44
					Bi-214	0.00435	103.64
					Ac-228		
					Th-228	0.0317	198.53
					Th-231	0.00492	200.75
					Th-234		
					U-235	0.00249	88.24

Annex G: Airborne Radionuclide Concentration Annual Graphs

This information was not available due to small sampling period.

Annex H: Topographic Maps

Topographic maps of the local area and Central Alaska

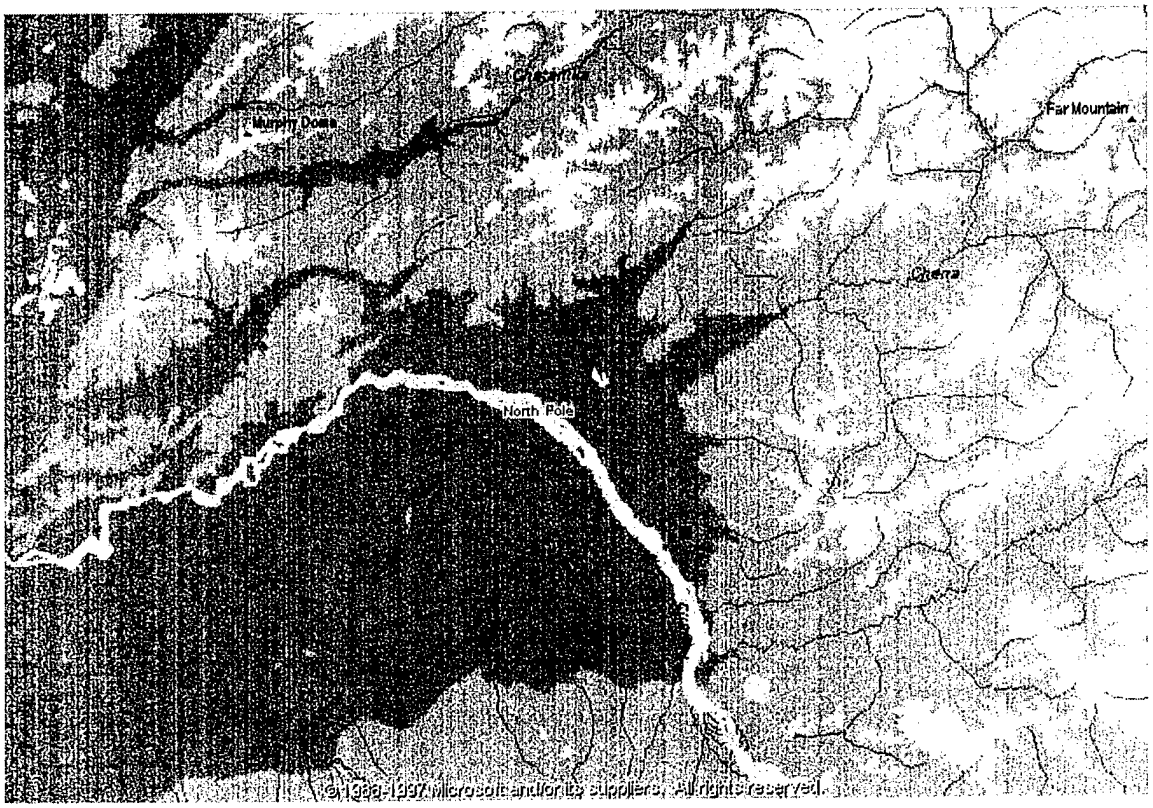


Figure H-1: Local Topography

Annex H: Topographic Maps (continued)

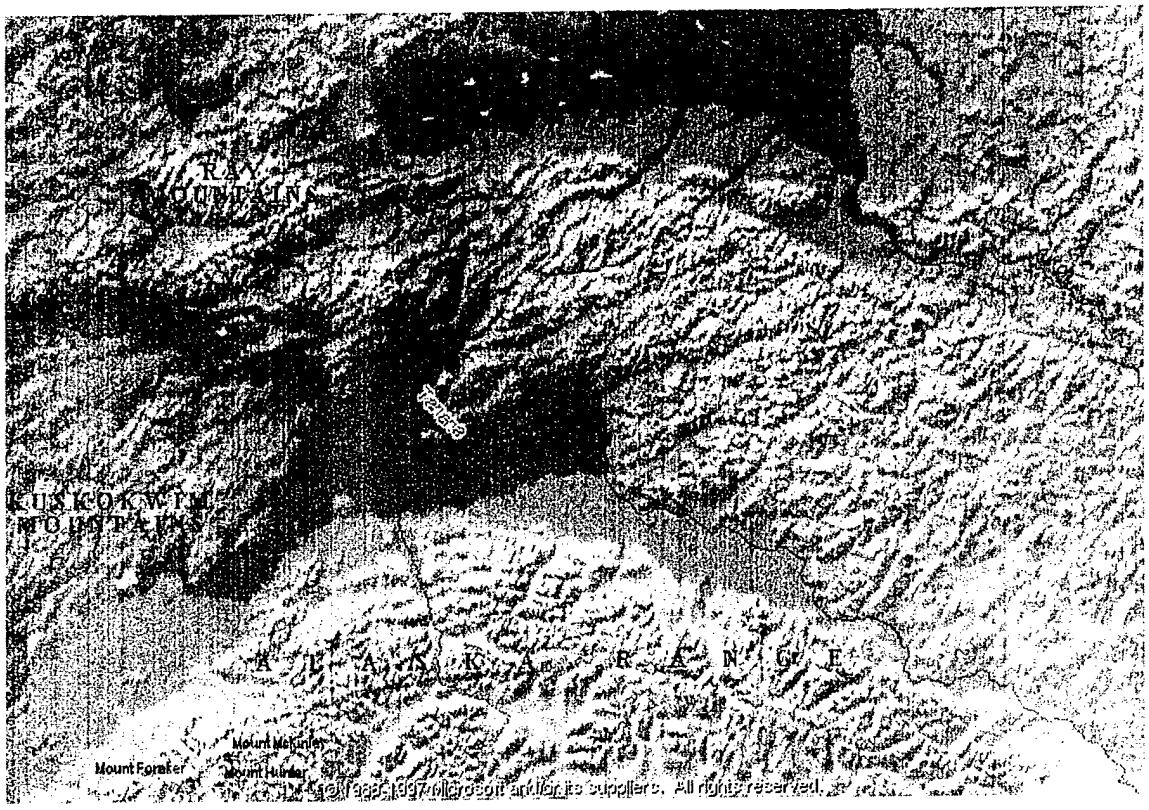


Figure H-2: Topography of Central Alaska

Annex I: Tectonic Area Map

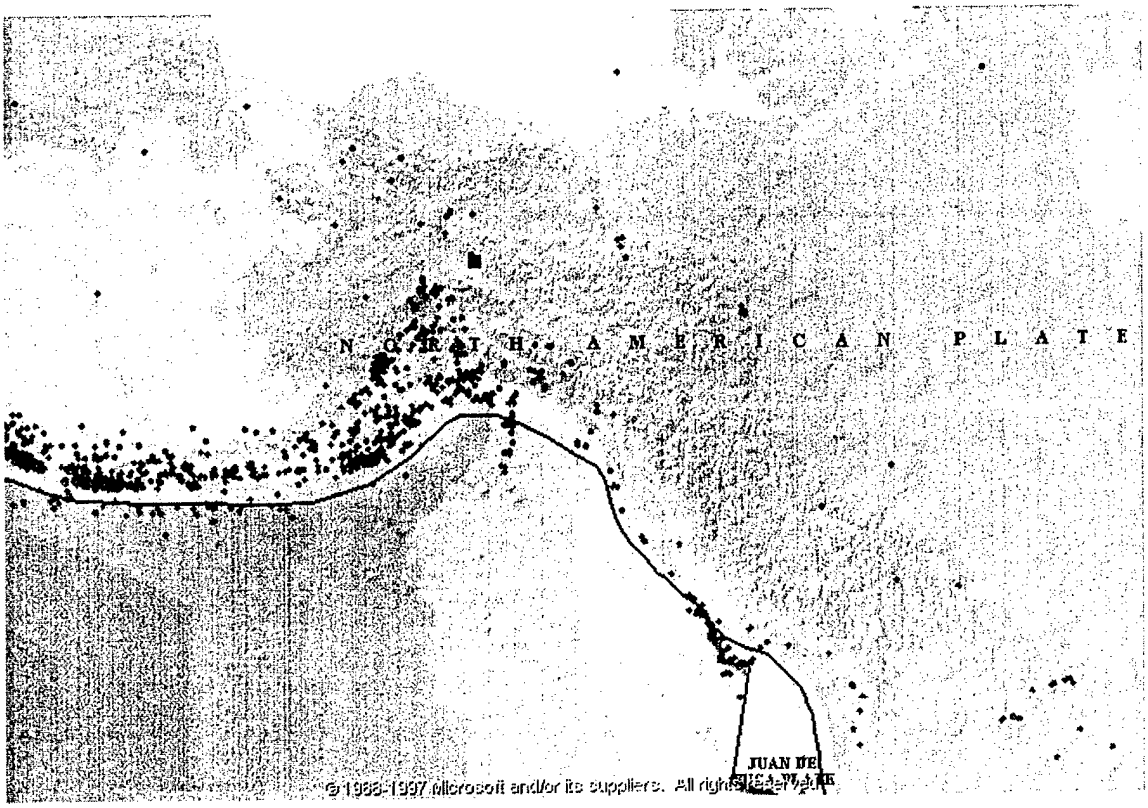


Figure I-1: Tectonic Map of Alaska

Annex J: Hazard Maps of Alaska

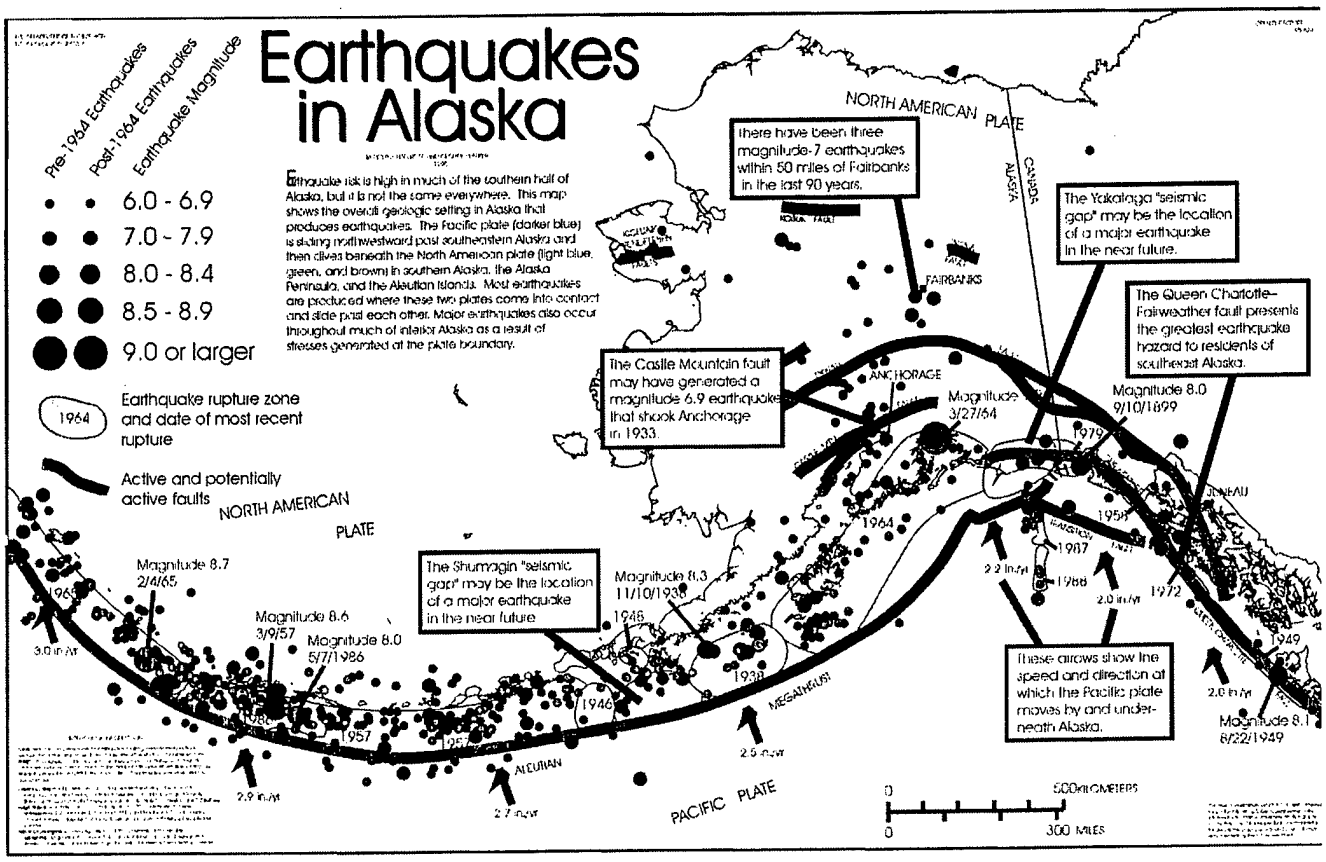


Figure J-1: Earthquake Hazard Map of Alaska

Annex J: Hazard Maps of Alaska (continued)

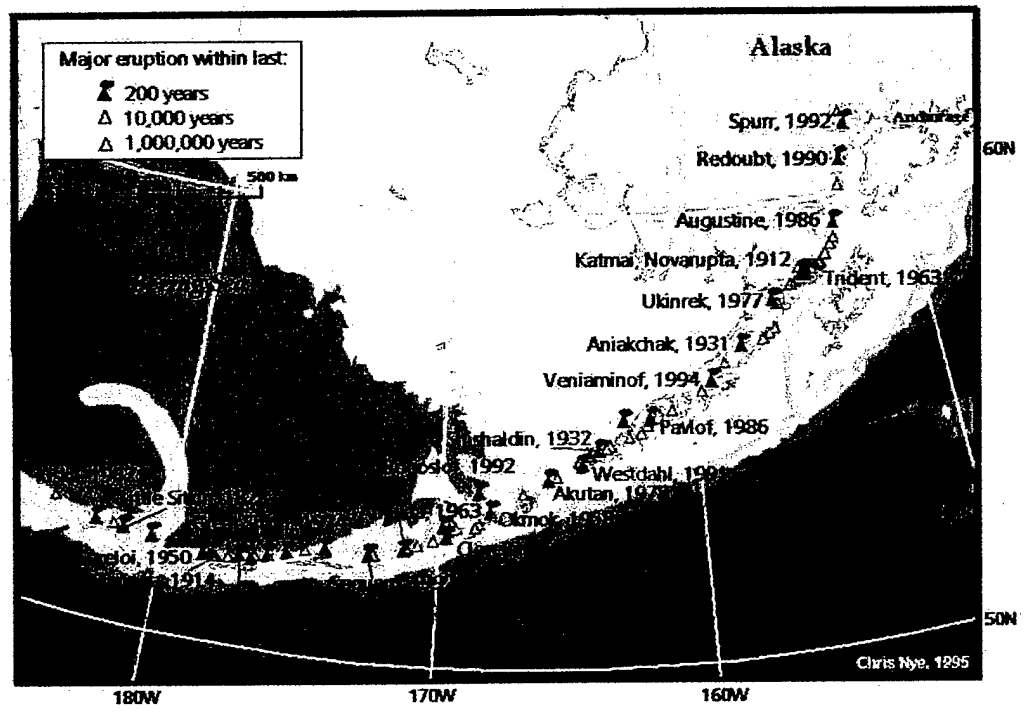


Figure J-2: Volcanic Hazard Map of Alaska

Annex K: Airborne Gamma Spectrometry Map

This information is not applicable.

Annex L: Equipment Used During Site Survey

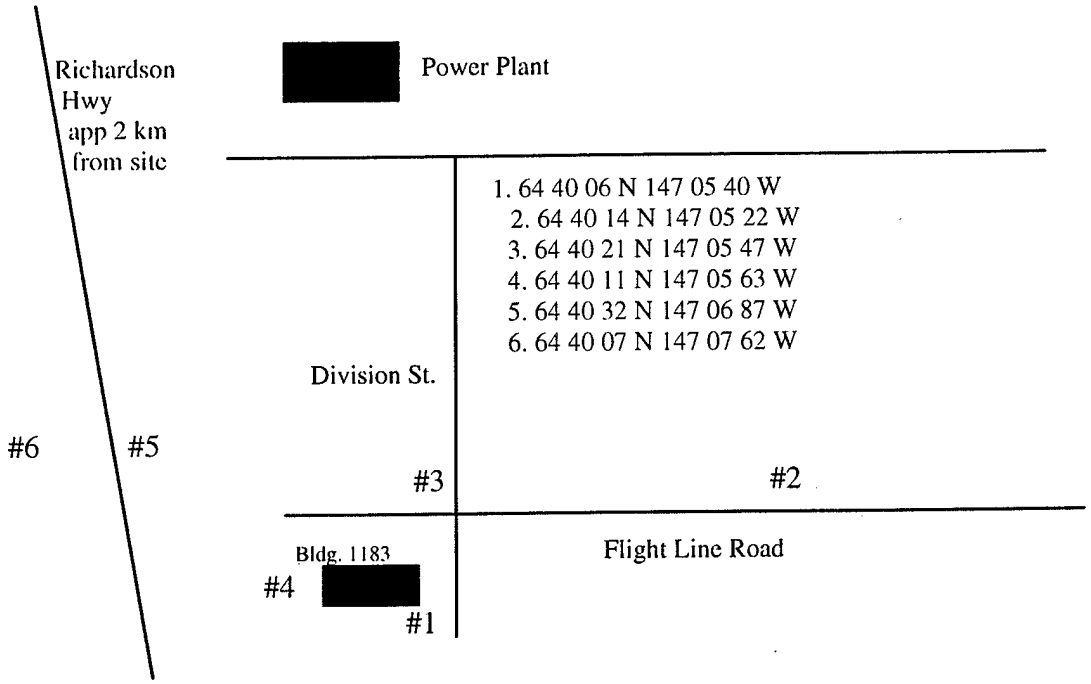
List of equipment used (with technical specifications and manufacturer) during the site survey.

Coordinates during the site survey were obtained by a Global Positioning System on the local AFTAC Distributed Subsurface Network (ADSN).

Annex M: Equipment Used for Air Sampling and Soil/Rock Samples

List of equipment used (with technical specifications and manufacturer) for the filter used during the on-site survey and the soil/rock samples.

Soil/Rock Samples: Four soil samples were collected from within a few hundred yards of the proposed RASA sampler site. Two more samples were collected from 1-3 kilometers upwind from the site. Samples were scooped into plastic vials after loose dust was brushed away from the soil surface. About 25 cm^3 of soil was contained in each vial. A map was sketched of the sample area, with all sampling sites marked. Labels were applied to each vial corresponding with sites on the sketch (Figure M-1 below). Vials were then placed in a sealable plastic bag and mailed to the laboratory.



Note: Map is not to scale

Figure M-1: Soil Sample Site Map

Air samples: Air samples were obtained with the Ground Filter Unit (GFU) previously installed at the site. See Section 5 for system specifications.

Annex N: Daily Activity Log

Log of overall daily activities during the site survey.

September 3-6, 1998	Ductwork, power, and communications installed.
September 18-21, 1998	Air and soil samples taken.
September 15, 1998 - February 16, 1999	Meteorological and background data collated and compiled.
November 1-5, 1998	RASA installed with assistance from DME.
February 17, 1999	Site survey report completed.

Annex O: Personnel List

List of the scientific and/or technical people who participated in the survey process (with phone number, fax and E-mail).

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Brian Bell, DCMC	Phone: (407) 381-6062 FAX: (407) 381-6063 E-mail: ago7284@dcmde.dla.mil
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Bob Thompson, PNNL	Phone: (509) 376-9216 FAX: (509) 373-6236 E-mail: rc_thompson@pnl.gov

Distribution List:

OSD/NTP	(2)
DTRA/OST	(1)
AFTAC/RM	(3)
AFTAC/CAS	(1)
AFTAC/LSCLM	(6)
AFTAC/TMSW	(1)
ASC Det 3	(1)
CTI	(3)
DTIC	(1)